

CLAIMS:

1. A system for coordinating radio resource usage in an unlicensed frequency band,
comprising:

5 a plurality of radio systems (20A-C) operating in the unlicensed frequency band
(24); and

a set of spectrum etiquette rules for coordinating radio resource usage by the
plurality of radio systems (20A-C), wherein the set of spectrum etiquette rules includes
a channel switching rule for determining a frequency channel of operation for at least
one of the plurality of radio systems (20B) based on a proximity of the frequency
10 channel of operation to an in-use frequency channel of operation that is associated with
the at least one of the plurality of radio systems (20B) .

2. The system of claim 1, wherein the set of spectrum etiquette rules further includes a
bandwidth selection rule for limiting a bandwidth consumption of the plurality of radio
15 systems (20A-C) to a reference channel bandwidth based on a bandwidth requirement of
the plurality of radio systems (20A-C), wherein each of the plurality of radio systems
(20A-C) will have a bandwidth consumption less than the reference channel bandwidth
unless they require more bandwidth than the reference channel bandwidth.

20 3. The system of claim 2, wherein the set of spectrum etiquette rules further includes a
power selection rule for limiting a power consumption of the plurality of radio systems
(20A-C) to a predetermined level based on the bandwidth consumption, wherein the
power consumption is inversely proportional to the bandwidth consumption.

4. The system of claim 1, wherein the set of spectrum etiquette rules further includes a deferring listen before talk (LBT) rule for requiring the plurality of radio systems (20A-C) to scan for an open frequency channel before communicating.
- 5 5. The system of claim 1, wherein the set of spectrum etiquette rules further includes a channelized LBT rule for requiring the at least one of the plurality of radio systems (20B) to scan all frequency channels (f_1 - f_3) within a reference channel bandwidth (22) before communicating.
- 10 6. The system of claim 1, wherein the set of spectrum etiquette rules further includes a synchronized LBT rule for requiring the at least one of the plurality of radio systems (20B) to synchronize a LBT process in time across neighboring frequency channels (f_1 - f_3) within the reference channel bandwidth (22).
- 15 7. The system of claim 1, wherein the plurality of radio systems (20A-C) comprises a reference channel radio system (20A), a narrow channel radio system (20B) and a wide channel radio system (20C), and wherein the at least one radio system (20B) includes the narrow channel radio system (20B).

8. A system for coordinating radio resource usage in an unlicensed frequency band, comprising:

a plurality of radio systems (20A-C), wherein the plurality of radio systems (20A-C) includes a reference channel radio system (20A), a narrow channel ratio system (20B) and a wide channel radio system (20C), and wherein a reference channel bandwidth (22) is defined based on the reference channel radio system (20A); and

a set of spectrum etiquette rules for coordinating radio resource usage by the plurality of radio systems (20A-C), wherein the set of spectrum etiquette rules includes a channel switching rule for determining a frequency channel of operation for the narrow channel radio system (20B) based on a proximity of the frequency channel of operation to an in-use frequency channel of operation that is associated with the narrow channel radio system (20B).

9. The system of claim 8, wherein the set of spectrum etiquette rules further includes a bandwidth selection rule for limiting a bandwidth consumption of the wide channel radio system (20C) to the reference channel bandwidth (22) based on a bandwidth requirement of the wide channel radio system (20C), wherein the wide channel radio system will have a bandwidth consumption less than the reference channel bandwidth (22) unless the wide channel radio system (20C) requires more bandwidth than the reference channel bandwidth (22).

10. The system of claim 9, wherein the set of spectrum etiquette rules further includes a power selection rule for limiting a power consumption of the wide channel radio system (20C) to a predetermined level based on the bandwidth consumption, wherein the power consumption decreases as the bandwidth consumption increases.

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11. The system of claim 8, wherein the set of spectrum etiquette rules further includes a deferring listen before talk (LBT) rule for requiring the reference channel radio system (20A) and the narrow channel radio system (20B) to scan for an open frequency channel before communicating.

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12. The system of claim 8 wherein the set of spectrum etiquette rules further includes a channelized LBT rule for requiring the narrow channel radio system (20B) to scan all frequency channels (f_1 - f_3) within the reference channel bandwidth (22) before communicating.

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13. The system of claim 8, wherein the set of spectrum etiquette rules further includes a synchronized LBT rule for requiring the narrow channel radio system (20B) to synchronize a LBT process in time across neighboring frequency channels (f_1 - f_3) within the reference channel bandwidth (22).

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14. A method for coordinating radio resource usage in an unlicensed frequency band, comprising:

defining a reference channel bandwidth (22) based on a reference channel radio system (20A); and

5 determining a frequency channel of operation for a narrow channel radio system (20B) based on a proximity of the frequency channel of operation to an in-use frequency channel of operation that is associated with the narrow channel radio system (20B).

15. The method of claim 14, further comprising limiting a bandwidth consumption of a
10 wide channel radio system (20C) to the reference channel bandwidth (22) based on a bandwidth requirement of the wide channel radio system (20C), wherein the bandwidth consumption of the wide channel radio system (20C) will be less than the reference channel bandwidth (22) unless the wide channel radio system (20C) requires more bandwidth than the reference channel bandwidth (22).

15 16. The method of claim 15, further comprising limiting a power consumption of the wide channel radio system (20C) to a predetermined level based on the bandwidth consumption, wherein the power consumption of the wide channel radio system (20C) decreases as the bandwidth consumption increases.

20 17. The method of claim 14, further comprising requiring the reference channel radio system (20A) and the narrow channel radio system (20B) to scan for an open frequency channel before communicating.

18. The method of claim 14, further comprising requiring the narrow channel radio system (20B) to scan all frequency channels (f_1 - f_3) within the reference channel bandwidth (22) before communicating.

5 19. The method of claim 14, further comprising requiring the narrow channel radio system (20B) to synchronize a listen before talk (LBT) process in time across neighboring frequency channels (f_1 - f_3) within the reference channel bandwidth (22).

20. The method of claim 14, wherein the frequency channel of operation for the narrow
10 channel radio system is adjacent to the in-use frequency channel of operation.

21. A radio device operating in an unlicensed frequency band, comprising:

means for enacting a set of spectrum etiquette rules for coordinating radio resource usage by the radio device, wherein the set of spectrum etiquette rules includes
15 a channel switching rule for determining a frequency channel of operation for the radio device based on a proximity of the frequency channel of operation to an in-use frequency channel of operation that is associated with the radio device .

22. The radio device of claim 1, wherein the means for enacting a set of spectrum
20 etiquette rules further includes a means for enacting a bandwidth selection rule for limiting a bandwidth consumption of the radio device to a reference channel bandwidth based on a bandwidth requirement of a plurality of radio systems (20A-C), wherein each of the plurality of radio systems (20A-C) will have a bandwidth consumption less than

the reference channel bandwidth unless they require more bandwidth than the reference channel bandwidth.

23. The radio device of claim 2, wherein the means for enacting a set of spectrum
 5 etiquette rules further includes means for enacting a power selection rule for limiting a power consumption of the radio device to a predetermined level based on the bandwidth consumption, wherein the power consumption is inversely proportional to the bandwidth consumption.

10 24. The radio device of claim 1, wherein the means for enacting a set of spectrum etiquette rules further includes means for enacting a deferring listen before talk (LBT) rule for requiring the radio device to scan for an open frequency channel before communicating.

15 25. The radio device of claim 1, wherein the means for enacting a set of spectrum etiquette rules further includes a means for enacting a channelized LBT rule for requiring the radio device to scan all frequency channels (f_1 - f_3) within a reference channel bandwidth (22) before communicating.

20 26. The radio device of claim 1, wherein the means for enacting a set of spectrum etiquette rules further includes a means for enacting a synchronized LBT rule for requiring the radio device to synchronize a LBT process in time across neighboring frequency channels (f_1 - f_3) within the reference channel bandwidth (22).

27. The radio device of claim 1, wherein the radio device further comprises at least one radio system (20B) which includes a narrow channel radio system (20B).

28. The radio device of claim 1, wherein the radio device is a reference channel radio (20A) and a reference channel bandwidth (22) is defined based on the reference channel radio (20A).

29. The radio device of claim 1, wherein the radio device is a narrow channel radio (20B).

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30. The radio device of claim 1, wherein the radio device is a wide channel radio (20C).

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